APPENDIX G
PHYSIOLOGICAL TRAINING OUTLINE

Course Objective: To familiarize personnel who are exposed to a lowered barometric pressure with the physiological stresses encountered and how to successfully overcome these stresses.

I. Physics of the Atmosphere

- A. Composition
- B. Pressure Density
- C. Layers and Characteristics
  1. Troposphere
  2. Stratosphere
- D. Gas Laws
  1. Boyle's Law
  2. Henry's Laws
  3. Dalton's Laws
  4. Charles's Laws
  5. Gaseous Diffusion

II. Respiration

- A. Function of Respiration
- B. Mechanics of Breathing
- C. Gas transfer
  1. External
  2. Internal
  3. Mechanics of Circulation and Blood Saturation

III Hypoxia

- A. Definition
- B. Types of Hypoxia
  1. Hypoxic Hypoxia
  2. Hypemic Hypoxia
  3. Histotoxic Hypoxia
  4. Stagnant Hypoxia
- C. Symptoms Associated with Altitude
- D. Times of Useful Consciousness
- E. Treatment of Hypoxia

F. Factors Influencing Tolerance

IV. Hyperventilation

A. Definition

B. Causes

C. Symptoms

D. Treatment

V. Decompression Sickness

A. Definition

B. Trapped Gases
1. Ear
2. Sinus
3. Stomach and Intestines
4. Teeth
5. Lungs

C. Evolved Gas Disorders
1. Bends
2. Parasthesia
3. Chokes
4. False Chokes
5. Central Nervous System Disorders

D. Factors Affecting Tolerance

VI. Oxygen Equipment

A. Storage System

B. Breathing Systems

C. Delivery Systems

D. Safety

E. Pre-Flight Oxygen Checklist

VII. Spatial Disorientation

A. Definition
1. Illusion
2. Sensory Illusion
3. Orientation of Equilibrium
4. Spatial Disorientation
5. Vertigo
6. Pilot's Vertigo

B. Organs of Equilibrium
   1. Visual
   2. Proprioreceptive
   3. Vestibular

C. Vision
   1. Anatomy
   2. Autokinesis
   3. Night Vision

D. Prevention of Spatial Disorientation

E. Overcoming Spatial Disorientation

VIII. Altitude Chamber Flight Profile I with Positive Pressure & Hypoxia Demonstration
(See Figure 1 below. Letters on Figure 1 correspond to the outline below)

Astronauts
NASA Pilots
Medical Officers
Payload Specialist

A. Pre-Flight
   1. Seating
   2. Equipment Hookup
   3. Pre-Flight Denitrogenation
   4. Communications Check
   5. Pre-Flight Chamber Systems Check

B. Ear and Sinus Check

C. Use of Specific Oxygen Equipment Used for Flight
   1. Abdominal Gas Expansion
   2. Evolved Gas Dysbarism
   3. Review of Acute Hypoxia and Time of Useful Consciousness

D. Experience Pressure Breathing at 35,000 feet - Chamber Flight Profile I

E. Hypoxia Demonstration at 28,000 feet - Chamber Flight Profile I
   1. Explanation of "Buddy System"
   2. Special Instructions for Recovery from Hypoxia

F. Postflight Disposition of Oxygen Equipment used

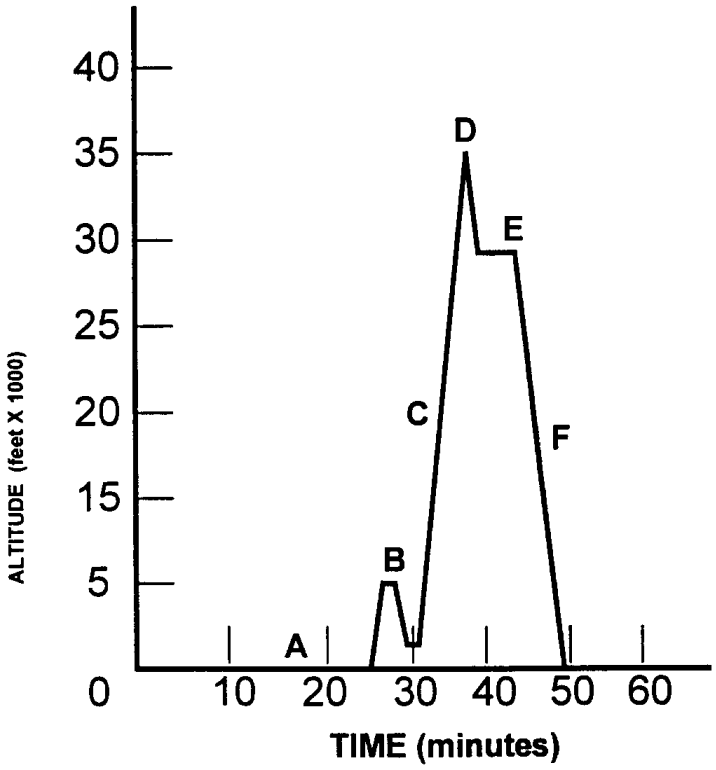

FIGURE 1 - Chamber Flight Profile I

IX. Altitude Chamber Flight Profile II with Positive Pressure & Hypoxia Demonstration
(See Figure 2 below. Letters on Figure 2 correspond to the outline below)

All Others not specified in Chamber Flight Profile I

A. Pre-Flight
1. Seating
2. Equipment Hookup
3. Pre-Flight Denitrogenation
4. Communications Check
5. Pre-Flight Chamber Systems Check

B. Ear and Sinus Check

C. Use of Specific Oxygen Equipment Used for Flight
1. Abdominal Gas Expansion
2. Evolved Gas Dysbarism
3. Review of Acute Hypoxia and Time Of Useful Consciousness

D. Hypoxia Demonstration at 25,000 feet - Chamber Flight Profile II
   1. Explanation of Buddy System"
   2. Special Instructions for Recovery from Hypoxia

E. Postflight Disposition of Oxygen Equipment used

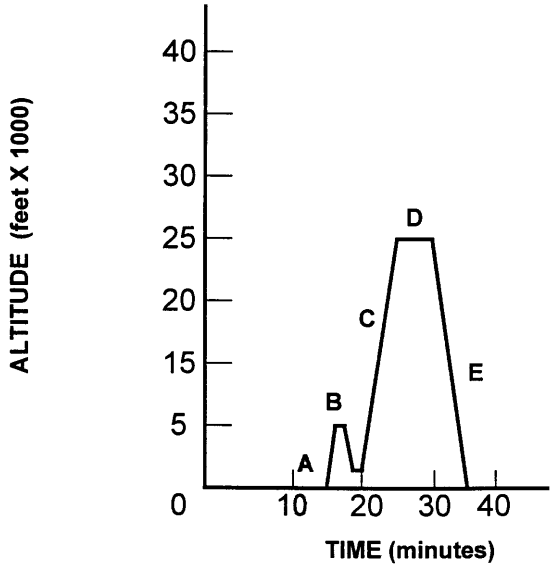

FIGURE 2 - Chamber Flight Profile II

X. Altitude Chamber Flight Profile Rapid Decompression (RD) Demonstration
(See Figure 3 below. Letters on Figure 3 correspond to the outline below)

Rapid Decompression Profile applies to both Chamber Flight Profile. I and II

A. Main Accumulator will ascend and level off at 25,000 ft.

B. The Outside Lock will ascend to 8,000 ft.

C. At 8,000 ft the RD will occur bringing the outside Lock to approximately 20,000.

D. When all inside personnel give thumbs up, Outside Lock will descend to Ground level

E. Postflight Disposition of Oxygen Equipment used

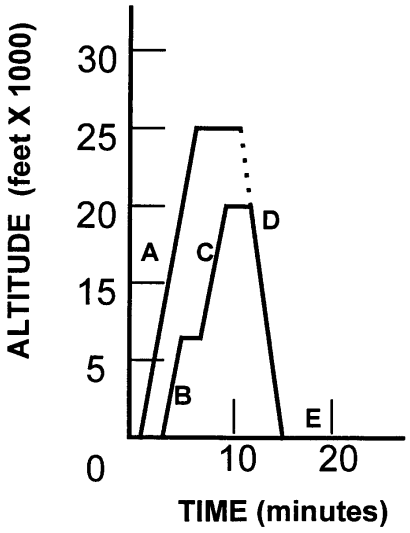

FIGURE 3 - Chamber Flight Profile Rapid Decompression